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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,950	09/20/2005	Charles H. Winter	WSU0200PUSA	1364
22045 7590 10/20/2008 BROOKS KUSHMAN P.C. 1000 TOWN CENTER TWENTY-SECOND FLOOR SOUTHFIELD, MI 48075				
EXAMINER				
ZIMMER, ANTHONY J				
ART UNIT		PAPER NUMBER		
1793				
MAIL DATE		DELIVERY MODE		
10/20/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/549,950

**Applicant(s)**

WINTER ET AL.

**Examiner**

ANTHONY J. ZIMMER

**Art Unit**

1793

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 August 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-59 is/are pending in the application.
- 4a) Of the above claim(s) 15-24 and 37-59 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 25-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/35108)  
Paper No(s)/Mail Date 9/14/2006, 2/28/2006
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

Claims 15-24 and 37-59 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 8/18/2008.

### ***Claim Objections***

Claims 1 and 25 are objected to because of the following informalities:

Claim 1 contains a grammatical error. The phrase, "the number of M atom" is used in the second to last line of the claim, including improper number agreement.

Claim 25 references Formula I, but recites  $\text{Cu}_x\text{O}_y$  as [Formula] II.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

**Claims 1-14 and 25-36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Claim 1 recites the limitation "the surface." There is insufficient antecedent basis for this limitation in the claim.

Claim 1 recites the limitation "the average number of M atoms." There is insufficient antecedent basis for this limitation in the claim.

Claim 1 recites the limitation "the average number of O atoms." There is insufficient antecedent basis for this limitation in the claim.

Claim 1 recites the limitation "the number of O atoms." There is insufficient antecedent basis for this limitation in the claim.

Claim 1 recites the limitation "the number of M atoms." There is insufficient antecedent basis for this limitation in the claim.

Claim 25 recites the limitation "the surface." There is insufficient antecedent basis for this limitation in the claim.

Claim 25 recites the limitation "the average number of Cu atoms." There is insufficient antecedent basis for this limitation in the claim.

Claim 25 recites the limitation "the average number of O atoms." There is insufficient antecedent basis for this limitation in the claim.

Claim 25 recites the limitation "the number of O atoms." There is insufficient antecedent basis for this limitation in the claim.

Claim 25 recites the limitation "the number of Cu atoms." There is insufficient antecedent basis for this limitation in the claim.

Claim 34 recites the limitation "the different oxidation states." There is insufficient antecedent basis for this limitation in the claim.

Dependent claims of claims 1 and 25 are rendered indefinite as a result.

***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-14 and 25-36 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over the journal article by Aslam et al.**

In regard to claims 1-3 and 25, Aslam teaches copper oxide ( $\text{Cu}_2\text{O}$ ) nanoparticles containing elemental copper in ratios of elemental copper to said copper oxide of 1:1, 1:3.5, and 1:3.5. See table 1. Using the notation of the instant claims, the composition of such particles can be represented as  $\text{Cu}_3\text{O}$ ,  $\text{Cu}_{16}\text{O}_7$ , and  $\text{Cu}_{16}\text{O}_7$ . Thus, the number of O atoms is at least 0.01 times the number of copper atoms.

Aslam is silent in regard to the total number of M (copper) atoms in each nanoparticle.

However, the nanoparticles of Aslam have the same composition as the claimed nanoparticles (see above), and have a size falling in the range of the instant invention. (See the 102/103 rejection of claims 6-8 and 28-30 below). Thus, the number of copper atoms would fall within the broad range required by the claims. Also, the method of preparing the nanoparticles in Aslam is substantially similar to the instant method, and thus the processes would produce substantially similar products. In particular, both processes react metal ions with heteroatom donor ligands (Aslam reacts copper chloride and one of three capping agents, i.e. donor ligands) and then reduce the product thereof. See Synthesis section on page 80 of Aslam. See also MPEP 2112.01. Said nanoparticles of Aslam are capped (i.e. with one or more heteroatom ligands are bonded to the surface of the nanoparticles). See Experimental section on page 80.

In regard to claims 4-5 and 26-27, Aslam teaches tridecylamine and lauric acid which contain nitrogen and oxygen molecules (respectively) that bond to the surface of the nanoparticles. Tridecylamine is an alkyl amine and lauric acid is a carboxylic acid.

In regard to claims 6-8 and 28-30, Aslam teaches particle sizes of 4-7 nm. See conclusion section on page 89, figures 5 and 6, and Table 1.

In regard to claims 9 and 31, Aslam teaches spherical, tubular (rod-shaped), and hexagonal (polyhedral) faceting shapes. See table 1 and Figures 5 and 6.

In regard to claims 10 and 32, Aslam teaches crystalline structure and amorphous structure. See Figure 6 and the text on pages 85-86.

In regard to claims 11-12 and 33, Aslam teaches a mixture of copper oxide ( $\text{Cu}_2\text{O}$ ) and elemental copper, i.e. oxidation states 0 and +1. See Table 1.

In regard to claims 13-14 and 35-36, Aslam teaches the copper oxide nanoparticles in a solution comprising the aforementioned capping agents, thus, in addition to the bound capping agents, loosely bound molecules in the solution thereof would exist. See the Experimental section on page 80.

In regard to claim 34, Aslam is silent in regard to the presence of  $\text{Cu}^{+2}$ , however, Aslam teaches drying in ambient conditions (i.e. including air). See caption of Figure 4 on page 83. Thus, since elemental copper is easily oxidized, at least a small amount would be oxidized to the +2 oxidation state.

**Claims 1-14 and 25-36 are rejected under 35 U.S.C. 102(a or e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Goldstein '145.**

In regard to claims 1-14 and 25-36, Goldstein teaches the formation of metal (copper) nanocrystals (nanoparticles) with sizes in the range of claims 6-8 and 28-30 that have an organic ligand bonded to the surface (including dodecylamine, which comprises nitrogen and is an alkyl amine). See Examples and claims.

Goldstein is silent in regard to the chemical composition, and the number of metal and oxygen atoms in said nanoparticles, and other properties required by the claims. However, the size of the nanoparticles is the same as those of the instantly claimed in invention. Furthermore, the method of preparing the nanoparticles in Goldstein is substantially similar to that of the instant invention. In particular, both processes form a complex of metal (copper) ions and a ligand and then reduce the

complex to form nanoparticles. See the abstract, examples, and claims of Goldstein. Thus, since the size and the process of making the nanoparticles of Goldstein are substantially similar to that of the instant invention, the product must also be substantially similar. See MPEP 2112.01.

In particular regard to claims 13-14 and 35-36, Goldstein teaches forming the nanoparticles in a solution comprising the ligand, thus, in addition to the bound ligand molecules, loosely bound molecules in the solution thereof would exist. See the Experimental section on page 80.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Borgohain et al., Ziegler et al., Lieber '945, and Rajagopalan '924 all teach copper oxide containing nanoparticles.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. ZIMMER whose telephone number is (571)270-3591. The examiner can normally be reached on Monday - Friday 7:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ajz

/Steven Bos/  
Primary Examiner, Art Unit 1793